The Field and the Compression: RSVP, Predictive Processing, and the Geometry of Assembly

Flyxion

October 27, 2025

Abstract

This essay explores how the Relativistic Scalar–Vector Plenum (RSVP) formalism integrates predictive processing [2], assembly theory [3], and compression as universal principles of cognition and physics.

1 Introduction

The RSVP model treats the universe as a plenum of interacting scalar, vector, and entropic fields. It unifies cognition and physics by identifying intelligence as a form of entropic geometry—a recursive process of compression and prediction embedded in spacetime itself [1].

2 Predictive Processing and Entropic Descent

Predictive processing suggests that the mind minimizes surprise by constantly refining internal models [2]. In RSVP, this is not only a neural process but a universal gradient: the descent of entropy through alignment between scalar potential Φ, vector flow $\mathbf{v}$, and entropy field S. Local coherence arises where prediction error vanishes:

$$\frac{dS}{dt} = -\nabla \cdot (\Phi \mathbf{v}) + \sigma.$$

Here, σ denotes dissipative corrections—the residue of learning. Systems evolve to minimize σ, replacing noise with structure.

3 Assembly and Historical Curvature

Assembly theory reframes complexity as a measure of historical work: the number of transformations required to construct a given entity [3]. RSVP situates this within field geometry: S carries the memory of work, while $\mathbf{v}$ encodes its negentropic trajectory. Every coherent structure is thus a fossil of successful compression—a trace of improbability sustained against dissolution.

4 Compression and the Physics of Meaning

Compression represents the universal attractor of the plenum: the drive for distributed information to fold into shorter generative codes, minimizing $H(S|\Phi, \mathbf{v})$. Meaning emerges when a system can predict its own entropy—when the code reconstitutes its conditions of existence. Beauty, intelligence, and order are all manifestations of this recursive compression [1].

5 Conclusion

RSVP, predictive processing, and assembly theory converge on the same principle: that persistence is compression under constraint. Whether physical, biological, or cognitive, all coherent systems are feedback loops that stabilize their internal representations of uncertainty. The universe learns by shortening its own description.

> "Every act of understanding is an act of entropy reduction."

References

[1] Jacob Barandes. Unistochastic quantum theory. *Foundations of Physics*, 2025.

[2] Karl Friston et al. Active inference and the physics of life. *Nature Reviews Neuroscience*, 2023.

[3] Sara Imari Walker Marshall and Leroy Cronin. Assembly theory and the origins of life. *Nature*, 2021.